High-Global Warming Potential Sources

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Overview

- What Are High-Global Warming Potential (GWP) Greenhouse Gases (GHGs)?
  - HFCs, PFCs, SF_6
    - Kyoto Protocol Gases
      - Emissions Control Varies by Country, Market System (Clean Development Mechanism, Voluntary Carbon Market)
  - Class I and II Ozone Depleting Substances (ODSs): CFCs, HCFCs, Halons, *et al.*
    - Montreal Protocol Gases
      - New Production, Imports, Exports Controlled; Emissions Not Controlled
  - Other High-GWP GHGs
    - NF_3, HFEs, PFPEs
    - Controlled Neither by Montreal Nor Kyoto Protocols

Overview

- How are High-GWP GHGs Accounted for under AB 32?
  - Kyoto Gases are Directly Included in 1990 Baseline and 2020 Target
  - Several non-Kyoto gases with climate impact are not in baseline but are being evaluated for mitigation

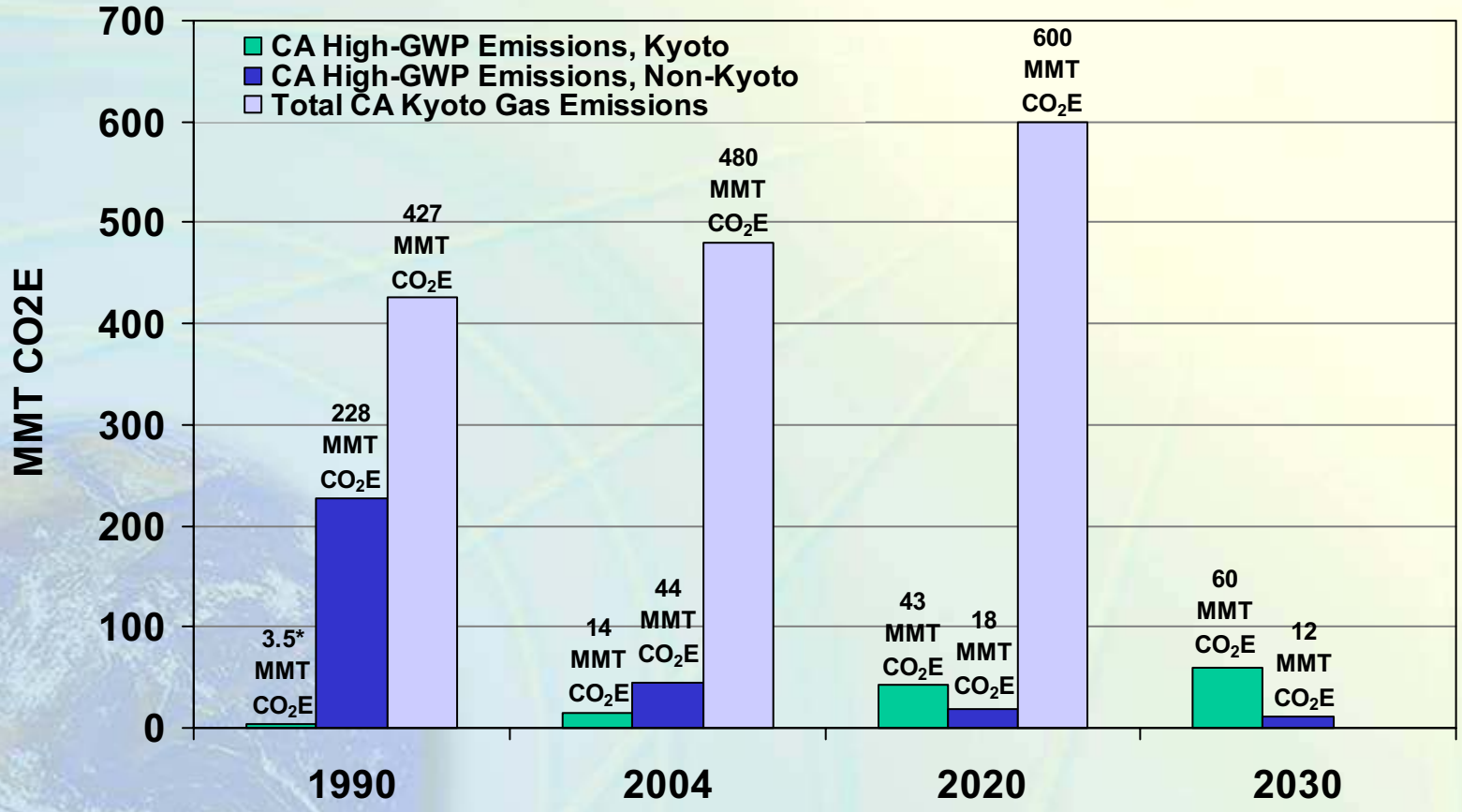
Overview

- High-GWP GHG "Sector" End-Use Categories
  - Mobile Sources
    - Motor Vehicle Air Conditioning (MVAC) Systems
  - Stationary Sources
    - Refrigeration and Air Conditioning (RAC), Foams, Fire Extinguishing, Solvent Cleaning, Industrial Applications, Electrical Transmission
  - Consumer Products
    - Propellants

California Emission Inventory (EI) Approaches

- USEPA Vintaging Model (VM) Estimates
  - VM Between IPCC Tier 2 and Tier 3 Inventory Development Approaches; VM is a Bottom-Up Model, but is Also Compared with Top Down Data
  - National Estimates Distributed from US to CA Based on Population Fraction
- Verification Based on Ambient Monitoring
  - Mt. Wilson Study, NOAA, MLD Network, Walnut Grove Study, AGAGE Network, Mobile Monitoring
- California-Specific Inventory Development
  - Numerous Inventory Studies and Surveys Underway for Stationary, Mobile, and Consumer Product High-GWP GHG Sources
- SCAQMD Rule 1415: ODS Leak Rate Data
  - Leak Rates for Large, Stationary RAC Systems Available from SCAQMD Rule 1415 Data

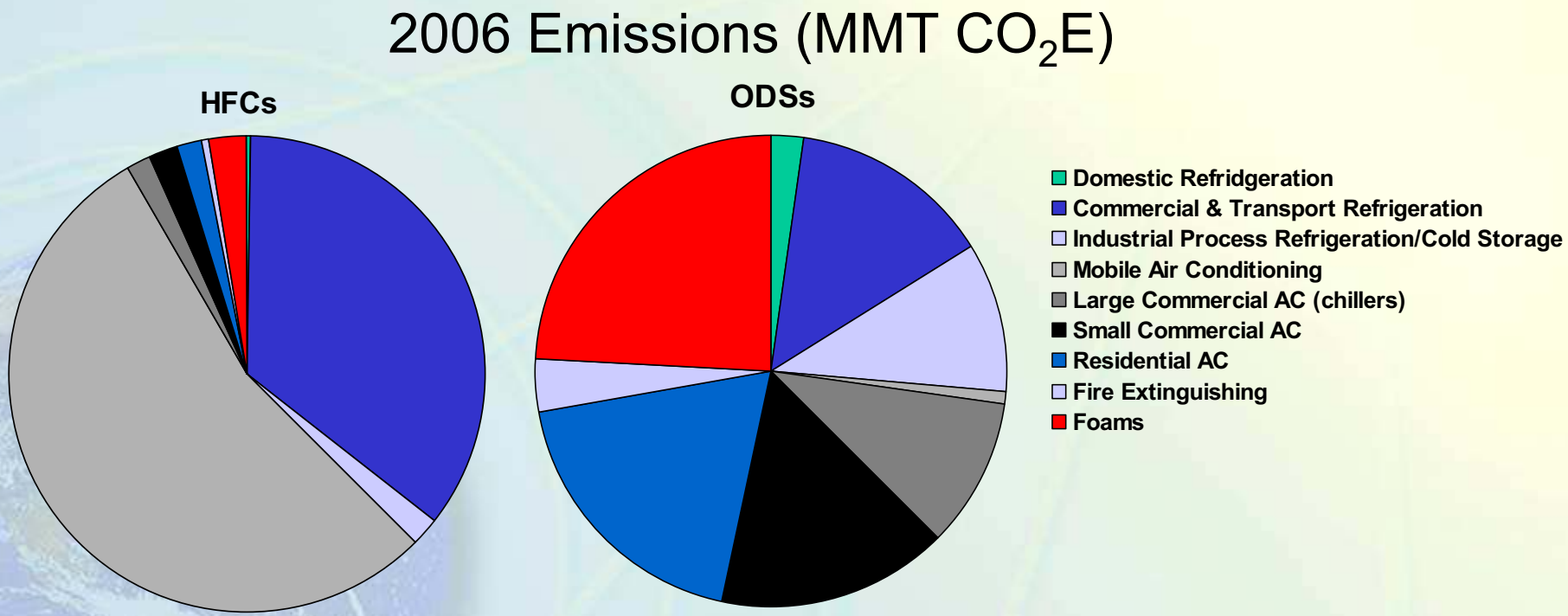
CA High-GWP GHG Emissions



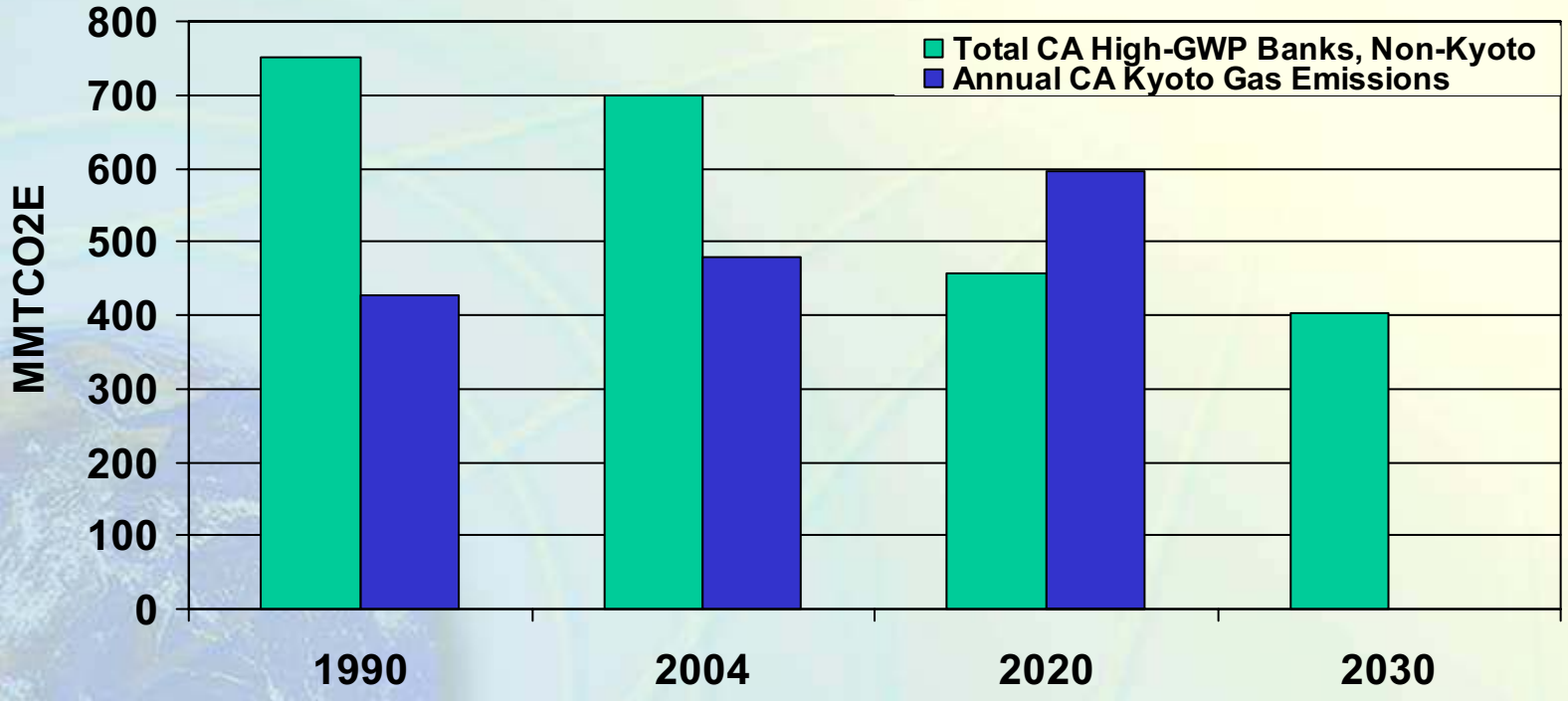
*Note: 3.5 MMT CO2E in 1990 represents all Kyoto gases, mostly SF_6

Major CA High-GWP GHG Emissions Sources

- Largest Sources Known From USEPA, IPCC/TEAP



CA High-GWP GHG Banks

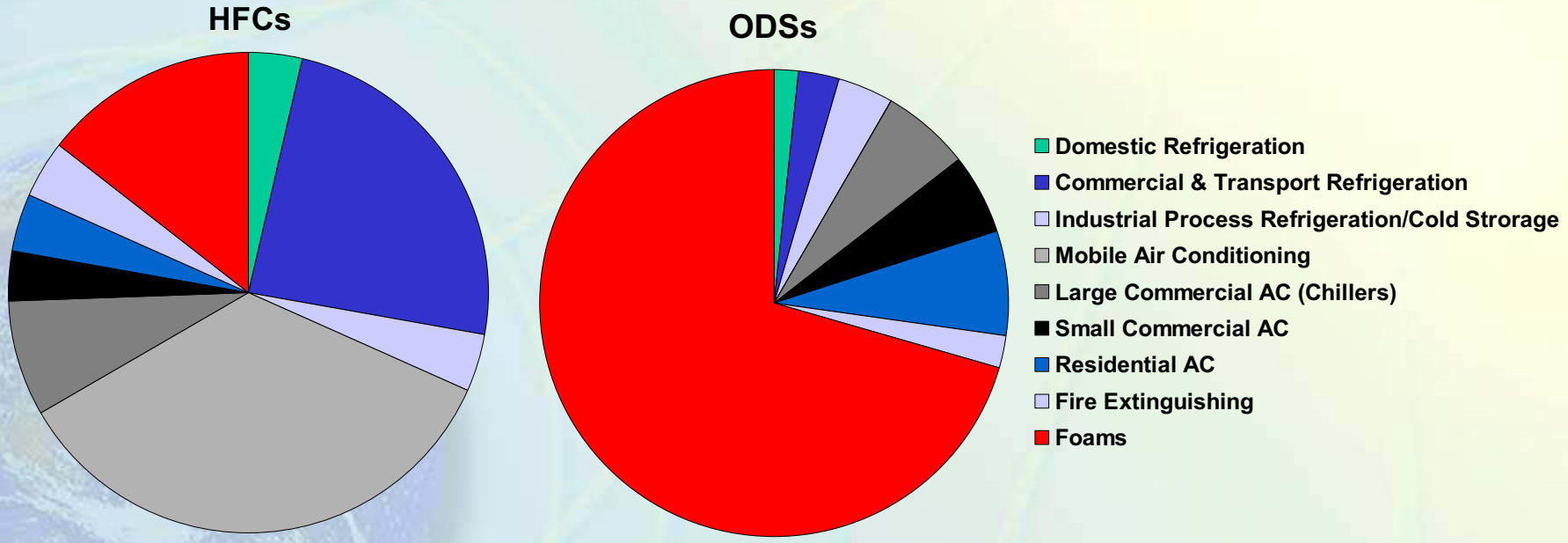


Note: Bank Estimates Exceed Total CO2E Estimates in 2004

Major CA High-GWP GHG Bank Sources

- Largest Sources Known From USEPA, IPCC/TEAP

2006 Banks (MMT CO_2E)



Existing Controls

- Existing Controls
  - HFCs Subject to “No Venting” Only
    - AB 1493 Will Reduce HFC-134a Emissions from MVACs
  - ODSs Have Some Sales, Record-Keeping, Technician/Handler, and Emissions Restrictions
    - Section 608 and 609 of CAAA and SCAQMD Rule 1415
  - ARB Regulates ODP of Consumer Products

Emission Reduction Approaches

- Existing Systems: Emissions and Bank Management
  - Extend Sections 608 – 609 of CAAA and Rule 1415 to All High-GWP GHGs
  - New EOL Rules and Enforcement of Existing Rules
  - Capture/Recycling/Destruction Where Applicable
  - Voluntary or Mandatory ODS Destruction
- Existing and New Systems
  - Deposit and Return
    - Increased Leak Repair and Equipment Turnover, EOL Stewardship

Emission Reduction Approaches

- New Production: High-GWP GHGs and Equipment
  - Improved Containment
  - Lower-GWP Substitutes
  - NIK Technologies/Lower Charge Systems
  - Improved Energy Efficiency (LCCP Considerations)
  - Deposit and Return
    - EOL Stewardship

Board-Approved Related Early Actions

EA ID	SECTOR	STRATEGY NAME	2020 Reduction, MMTCO2E	2020 Cost Estimates, MTCO2E
12	Consumer Products	Reduction of high GWP GHGs used in consumer products	0.25	$4-$5/MTCO2E
16	Mobile	Reduction of HFC-134a from DIY MVAC servicing	1	TBD
23	Stationary	SF_6 reductions from the non-electric sector	0.1	TBD
28	Mobile	Ban of HFC release from MVAC service / dismantling	0.1	TBD
30	Mobile	Add AC leak tightness test and repair to Smog Check	0.45	TBD
32	Stationary	Specifications for commercial refrigeration	4.7	$10-$20/MTCO2E
34	Mobile	Requirement of low-GWP GHGs for new MVACs	2.5	TBD
36	Stationary	Reduction of SF_6 in electricity generation	TBD	TBD
37	Stationary	High GWP refrigerant tracking, reporting, and recovery program	1.25 - 12+	TBD
38	Stationary	Foam recovery/destruction program	0.9 - ?	$6.5/TCO2E for automated; $48/MTCO2E for manual
39	Stationary	Alternative suppressants in fire protection systems	0.1	$40/MTCO2E
		Totals	**11 - 23+**	**$4 - $48**

Activities Underway

- Continuing to Move Forward with Analyses, Working with Stakeholder Groups (2/08 Workshop)
- Research Projects Underway
  - MVAC Indirect, Direct, and EOL Emissions Studies
  - Inventory Development
    - All End-Use Categories (non-1493 MVACs, RAC, Foam, Solvent, Propellant, Electrical Transmission, and Fire Extinguishing/Chemical Stockpile Inventories)
  - LCA of High-GWP GHG Destruction

Summary

- High-GWP GHG "Sector" Contains a Diverse Array of Chemicals and End-Use Categories
- Control Strategies Include High-GWP GHG Emission and Bank Management (Especially HFCs and ODSs)
- Good Potential for Cost-Effective Emission Reductions
- Potential to Include as Source of Offsets will be evaluated